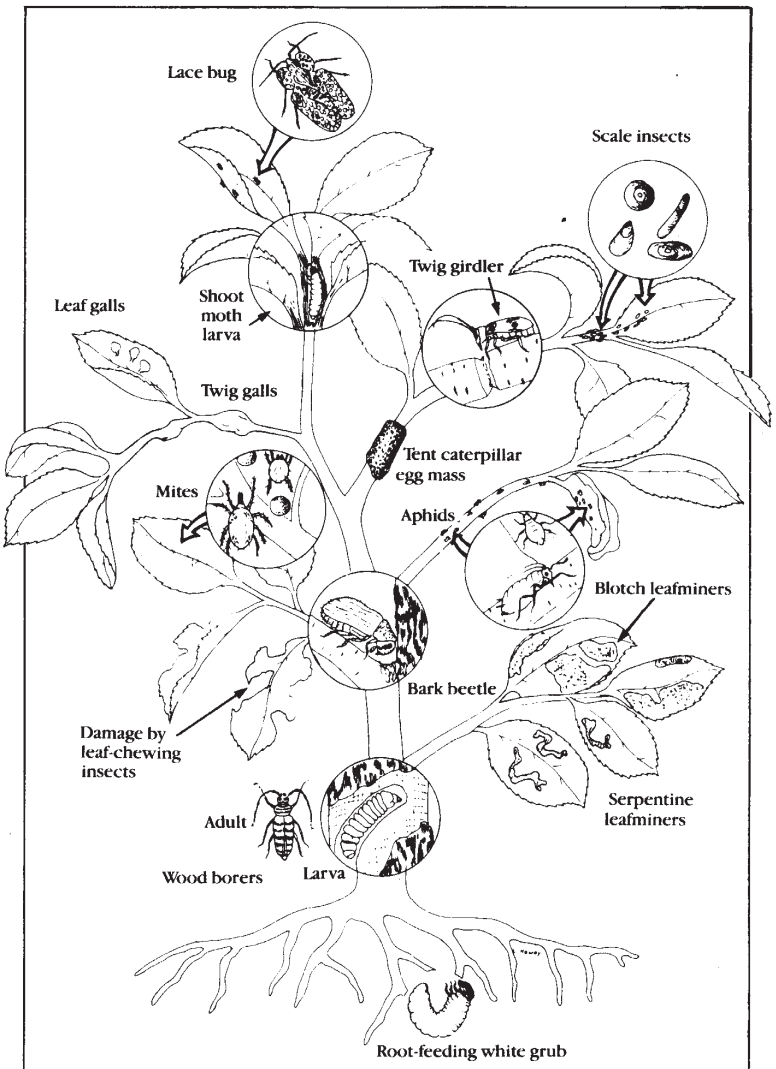
1 DIAGNOSIS AND IDENTIFICATION OF PLANT DISORDERS

Diagnosis is the process of recognizing a disorder from its symptoms and signs whether the disorder is caused by something in the physical environment, an infectious organism (pathogen), or an insect. The diagnostic process should include looking at the entire plant as well as its separate parts, carefully analyzing the observations, and attempting to understand or explain why a disorder has occurred.

Symptoms on plants include leaf spots, blights, wilt, yellows, galls, leaf mines, and skeletonized leaves. The same symptoms may be caused by different organisms or abnormalities in the physical environment and thus may require different management practices. A sign of a pathogen might be the white powdery fungus growth that occurs on leaves infected with powdery mildew. A sign of an insect infestation might be the presence of scale insects on twigs or leaves (see illustration on this page).

Diagnosis is an often complicated process that involves broad horticultural knowledge as well as patience and sleuthing. It is usually difficult to explain why one plant in a hedge declines or dies while the others appear healthy. The history of a plant and its treatment, intentional or otherwise, may reveal the answer to a diagnostic problem. Diagnosis may also be simple, especially if the cause produces indisputable symptoms or has recognizable signs. Finding an insect (the sign) chewing on a leaf in a characteristic pattern (the symptom) can result in a positive diagnosis.



Insects and Injury

Ways Insects Injure Plants

Chewing. Devouring, notching, or mining leaves; eating wood, bark, roots, stems, fruit, seeds. Symptoms: ragged leaves, holes in wood and bark or fruit and seed, serpentine mines or blotches, wilted or dead plants, presence of "worms."

Sucking. Removing sap and cell contents and injecting toxins into plant. Symptoms: usually off-color, misshapen foliage and fruit.

Vectors of diseases. Carrying diseases from plant to plant, e.g., elm bark beetles are vectors of Dutch elm disease, various aphids are vectors of certain viral diseases. Symptoms: wilt; dwarf, off-color foliage.

Excretions. Honeydew deposits lead to the growth of sooty mold, and the leaves cannot manufacture food. A weakened plant is the result. Symptoms: sooty black leaves, twigs, branches, and fruit.

Gall formation. Forming galls on leaves, twigs, buds, and roots. Galls disfigure plants, and twig galls often cause serious injury.

Oviposition scars. Forming scars on stems, twigs, bark, or fruit. Symptoms: scarring, splitting, breaking of stems and twigs, misshapen and sometimes infested fruit.

Injection of toxic substances. Symptoms: scorch, hopper burn.

Examples of insect injury to plants are shown at left.

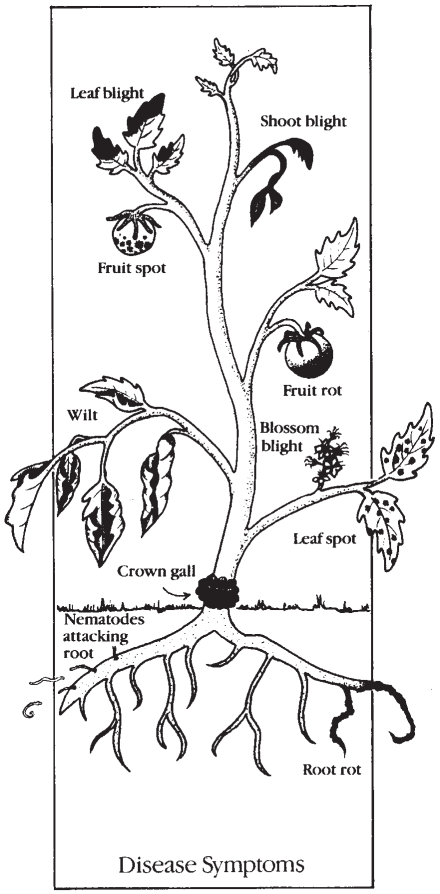
Identifying pests can be as easy as recognizing a dandelion from a picture. Generally speaking, however, the smaller the offending organism, the more difficult it is to identify. This is the case for many plant diseases. Occasionally the cause of a disorder is synonymous with the symptom. For example, mined leaves of a birch mean birch leafminer; scab lesions on apple mean apple scab. If an animal is chewing on a leaf, a degree of identification is necessary before any management practice can be suggested. To know that it is a caterpillar may be adequate for making a pest management decision, but determining the kind of caterpillar is a job for a specialist. Likewise, many infectious microorganisms can be confirmed only by laboratory tests.

What can the home gardener do when confronted with diagnosis and identification problems? An experienced neighborhood gardener may be a source of reliable information. Local expertise can be valuable. Nursery operators and garden supply dealers may be able to provide significant help. If an arboretum or botanical garden is within reasonable distance, the specialist there may be of help. Many Cooperative Extension offices employ experienced horticulturists and have additional diagnostic resources available through New York State's land-grant university system.

If precise identification or accurate confirmation of a disorder is required, a suitable example or specimen must be taken or sent to a diagnostic labotory or a consultant. For plant identification or disease diagnosis, collect specimens that are dry. Place fresh leaves between layers of dry paper towels, sandwich this between stiff cardboard, then enclose it all in an envelope. If the leaves are diseased, send ones that represent a range of symptoms. Freshly cut branches arrive in best shape when the cut end is wrapped in a moist paper towel and enclosed in a plastic bag fastened above the paper towel. Be sure to punch a few holes in the plastic bag.

If insects are to be mailed, be sure they are dead. Collect adult insects in a small container and place them in a freezer for a few days to kill them. Add some paper toweling to help dry the insects, and package them in a crush-proof container for shipping. Enclose at least five specimens and indicate the kind of plant they are feeding on and where they are found, especially if they are household pests. Preserve immature or soft-bodied insects by dropping them in boiling water for a few seconds and then placing them in rubbing alcohol. Whether submitting a plant or insect, always include detailed information about the infestation, the history of the plant, and the disorder.

Remember, a plant can fail for many reasons—insects and diseases are only two possibilities. Other causes include unsuitable moisture conditions, air and water pollution, unfavorable soil pH, winter freezing or drying injury, poor cultural techniques, and incorrect plant choice for the location. Be sure of the cause before you decide on a pest management strategy.



Ways Infectious Diseases Injure Plants

Destroying or injuring leaves. Examples: brown patch disease of turf, early blight, anthracnose. Symptoms: black, brown, red, or yellow spots on leaves; dead leaves; leaves that drop off earlier than normal.

Interfering with or blocking water conduction inside stems. Examples: Dutch elm disease, Verticillium wilt. Symptoms: yellow, wilted, or brown leaves; dark brown streaks inside the stem.

Destroying or injuring roots. Examples: Pythium root rot, club root, root knot nematode. Symptoms: black or brown roots, galls on roots, stunting of the plant, yellow or brown leaves.

Destroying or injuring flowers, fruit, or food products. Examples: fire blight, apple scab, potato scab. Symptoms: dead flowers, black or brown spots on flowers or produce.

Destroying or injuring stems or shoots. Examples: Diplodia tip blight, Botrytis blight, Nectria canker. Symptoms: dead shoots or stems; cankered areas on branches, brown, shriveled, clinging leaves; brown inner bark.

Disrupting normal cellular organization (gall-forming diseases). Examples: crown gall, root knot nematode. Symptoms: unusual growths on flowers, leaves, twigs, or roots.

Symptoms of injury to plants from infectious diseases are shown at left.